

CLAIMS

1. A Schottky diode comprising:
 - a polycrystalline organic semiconductor layer;
 - a rectifying contact on a first surface of the organic semiconductor layer;
 - 5 a doped buffer layer in contact with a second surface of the organic semiconductor layer, the doped buffer layer formed of an amorphous doped organic semiconductor; and
 - an ohmic contact to the doped buffer layer.
- 10 2. The Schottky diode of claim 1 wherein the organic semiconductor layer is a π -conjugated polymer.
- 15 3. The Schottky diode of claim 1 wherein the organic semiconductor layer is chosen from a group consisting of pentacene, metal-free phthalocyanine and metallocphthalocyanine, fullerene doped with indium or antimony, polyaniline, polypyrrole, poly(p-phenylene), poly(p-phenylenevinylene), a substituted pentacene compound, a bis(2-acenyl)acetylene compound, an acene-thiophene compound, F₁₆CuPc, F₁₆ZnPc, F₁₆FePc, F₁₆CoPc and N,N'-dioctyl-3,4,9,10-perylene tetracarboxylic diimide.
- 20 4. The Schottky diode of claim 1 wherein the amorphous organic semiconductor has a thickness between 1500 and 10,000 angstroms.
5. The Schottky diode of claim 4 wherein the amorphous organic semiconductor has a thickness between 2000 and 5000 angstroms.
- 25 6. The Schottky diode of claim 1 wherein the amorphous organic semiconductor is MTDATA.
7. The Schottky diode of claim 6 wherein the MTDATA is doped with F₄-TCNQ.

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8. The Schottky diode of claim 7 wherein the MTDATA is doped with 3-20% F₄-TCNQ.

9. The Schottky diode of claim 8 wherein the MTDATA is doped with 5-10% F₄-TCNQ.

10. A Schottky diode comprising:
a substrate;
an ohmic contact with a first surface in contact with a first surface of the
10 substrate;
a doped buffer layer with a first surface in contact with a second surface of the
ohmic contact, the doped buffer layer formed of an amorphous doped
organic semiconductor;
a polycrystalline organic semiconductor layer with a first surface in contact
15 with a second surface of the doped buffer layer; and
a rectifying contact with a first surface in contact with a second surface of the
organic semiconductor layer.

11. The Schottky diode of claim 10 wherein the organic semiconductor layer is a π
20 - conjugated polymer.

12. The Schottky diode of claim 10 wherein the organic semiconductor layer is
chosen from a group consisting of pentacene, metal-free phthalocyanine and metalloc
phthalocyanine, fullerene doped with indium or antimony, polyaniline, polypyrrole, poly(p-
25 phenylene), poly(p-phenylenevinylene), a substituted pentacene compound, a bis(2-acenyl)acetylene compound, an acene-thiophene compound, F₁₆CuPc, F₁₆ZnPc, F₁₆FePc,
F₁₆CoPc and N,N'-dioctyl-3,4,9,10-perylene tetracarboxylic diimide.

13. The Schottky diode of claim 10 wherein the amorphous organic semiconductor
30 has a thickness between 1500 and 10,000 angstroms.

14. The Schottky diode of claim 13 wherein the amorphous organic semiconductor has a thickness between 2000 and 5000 angstroms.

15. The Schottky diode of claim 10 wherein the amorphous semiconductor is
5 MTDATA.

16. The Scottky diode of claim 15 wherein the MTDATA is doped with F₄-TCNQ.

10 17. The Schottky diode of claim 16 wherein the MTDATA is doped with 3-20% F₄-TCNQ.

18. The Schottky diode of claim 17 wherein the MTDATA is doped with 5-10% F₄-TCNQ.

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19. A Schottky diode comprising:
a substrate;
a rectifying contact with a first surface in contact with a first surface of the substrate;
20 a polycrystalline organic semiconductor layer with a first surface in contact with a second surface of the rectifying contact;
a doped buffer layer with a first surface in contact with a second surface of the polycrystalline organic semiconductor layer, the doped buffer layer formed of an amorphous doped organic semiconductor; and
25 an ohmic contact with a first surface in contact with a second surface of the doped buffer layer.

20. The Schottky diode of claim 19 wherein the organic semiconductor layer is a π-conjugated polymer.

21. The Schottky diode of claim 19 wherein the organic semiconductor layer is chosen from a group consisting of pentacene, metal-free phthalocyanine and metalloc phthalocyanine, fullerene doped with indium or antimony, polyaniline, polypyrrole, poly(p-phenylene), poly(p-phenylenevinylene), a substituted pentacene compound, a bis(2-acenyl)acetylene compound, an acene-thiophene compound, F₁₆CuPc, F₁₆ZnPc, F₁₆FePc, F₁₆CoPc and N,N'-dioctyl-3,4,9,10-perylene tetracarboxylic diimide.

22. The Schottky diode of claim 19 wherein the amorphous organic semiconductor has a thickness between 1500 and 10,000 angstroms.

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23. The Schottky diode of claim 22 wherein the amorphous organic semiconductor has a thickness between 2000 and 5000 angstroms.

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24. The Schottky diode of claim 19 wherein the amorphous organic semiconductor is MTDATA.

25. The Schottky diode of claim 24 wherein the MTDATA is doped with F₄-TCNQ.

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26. The Schottky diode of claim 25 wherein the MTDATA is doped with 3-20% F₄-TCNQ.

27. The Schottky diode of claim 26 wherein the MTDATA is doped with 5-10% F₄-TCNQ.

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